CLAIMS:

1. A process for producing liquid and, optionally, gaseous products from gaseous reactants, which process includes

feeding, at a low level, gaseous reactants into a slurry bed of solid catalyst particles suspended in a suspension liquid;

allowing the gaseous reactants to react as they pass upwardly through the slurry bed, thereby to form liquid and, optionally, gaseous products, with the reaction being catalyzed by the catalyst particles and with a product mixture comprising liquid product and catalyst particles having a range of sizes, being formed;

subjecting, in a primary filtration stage, the product mixture to primary filtration by passing the liquid product through a filtering medium having a plurality of filtering openings through which the liquid product passes, with the liquid product passing through the filtering openings in a first direction and with the filtering openings having a controlling dimension of x microns, so that large catalyst particles having a particle size greater than x microns are separated from the liquid product, thereby to obtain a primary filtrate comprising liquid product, near-size catalyst particles, and fine catalyst particles;

subjecting, in a secondary filtration stage, the primary filtrate to secondary filtration to separate the near-size catalyst particles and, optionally, some of the fine catalyst particles, from liquid product, thereby to obtain a secondary filtrate comprising liquid product and, optionally, fine catalyst particles;

allowing a cake of catalyst particles to build up on the filtering medium in the primary filtration stage;

from time to time interrupting the passage of liquid product through the filtering medium in the primary filtration stage; and

backflushing the filtering medium by passing secondary filtrate, as a flushing liquid, through the filtering medium in a second direction, opposite to the first direction, for at least portions of the periods that the liquid product passage is interrupted, thereby to dislodge the cake from the filtering medium.

2. A process as claimed in Claim 1, wherein the suspension liquid is liquid product.

3. A process as claimed in Claim 2, wherein the hydrocarbon synthesis is Fischer-Tropsch synthesis, with the gaseous reactants being in the form of a synthesis gas stream comprising mainly carbon monoxide and hydrogen, with both liquid and gaseous hydrocarbon products being produced, and with the catalyst particles thus being Fischer-Tropsch catalyst particles.

4. A process as claimed in Claim 3, wherein the slurry bed is provided in a vessel, with unreacted reactants and gaseous product being withdrawn from the vessel above the slurry bed, and with the vessel being maintained at Fischer-Tropsch synthesis pressure and temperature conditions.

5. A process as claimed in Claim 4, wherein the large catalyst particles in the slurry bed thus have particle sizes greater than x microns, while the near-size catalyst particles range in size from 1 micron to about x microns and the fine catalyst particles are smaller than 1 micron.

6. A process as claimed in Claim 5, wherein the catalyst is an iron-based or a cobalt-based Fischer-Tropsch catalyst.

7. A process as claimed in Claim 6, wherein the catalyst is an iron-based Fischer-Tropsch catalyst, with the controlling dimension of the filtering openings being 25 microns, with catalyst particles larger than 25 microns being filtered out in the primary filtration stage and forming the cake on the filtering medium, and with catalyst particles having sizes in the range 1 micron to 25 microns being near-size catalyst particles, while those smaller than 1 micron are fine catalyst particles.

8. A process as claimed in Claim 7, wherein the catalyst is a cobalt-based Fischer-Tropsch catalyst, with the controlling dimension of the filtering openings being 10 microns.

9. A process as claimed in any one of Claims 4 to 8 inclusive, wherein the filtering medium is part of a filter element which is mounted inside the vessel and is of elongate form, with the filtering medium being of cylindrical form and enclosing a filtrate collecting zone, and with a filtrate outlet for withdrawing filtrate being provided at one end of the filter element.

10. A process as claimed in Claim 9, wherein the primary filtration stage is located inside the slurry bed.

11. A process as claimed in Claim 10, which includes providing a plurality of the filter elements, located at different levels within a filtration zone below the upper surface of the slurry bed.

12. A process as claimed in Claim 11, wherein the passage of the liquid product through the filtering media is effected by applying a pressure differential across the filtering media and any cake build-up thereon.

13. A process as claimed in Claim 12, wherein the pressure differential is effected by withdrawing the primary filtrate into a primary filtrate collection vessel which is at a lower pressure than the vessel, with the filtrate outlets of the filter elements being connected to the primary filtrate collection vessel by means of liquid product conduits.

14. A process as claimed in Claim 12 or Claim 13, wherein the secondary filtration stage is located outside the vessel.

15. A process as claimed in Claim 14, wherein the secondary filtration stage is provided by a vertically or horizontally orientated pressure leaf filter.

16. A process as claimed in Claim 14 or Claim 15, wherein the secondary filtration stage includes filterable granular filter aid material.

17. A process as claimed in any one of Claims 12 to 16 inclusive, wherein the backflushing is effected for at least portions of the periods that the liquid product passage through the filtering media of the primary filtering stage is interrupted.

18. A process as claimed in Claim 17, wherein the backflushing is effected in pulse-like fashion.

19. A process as claimed in Claim 18, wherein the backflushing comprises an initial pulse of flushing liquid, followed by one or more further pulses of flushing liquid, with each backflushing pulse comprising initiating backflushing rapidly, and backflushing the elements rapidly with a volume of the flushing liquid.

20. A process as claimed in Claim 19, wherein the volume of flushing liquid used during the initial pulse is at least three times the internal volume of the filter elements.

21. A process as claimed in Claim 20, wherein the volume of flushing liquid used during a second pulse is less than that used during the initial pulse.

22. A process as claimed in any one of Claims 11 to 21 inclusive, wherein the pressure differential across the filtering media and filter cake during backflushing is up to 10 bar depending on the degree of clogging or age of the filtering media.

23. A process as claimed in any one of Claims 11 to 22 inclusive, wherein the flushing liquid flow rate is at least 6000 ℓ/h/m^2 of filtering media.

24. A process as claimed in any one of Claims 11 to 23 inclusive, which includes subjecting the filter elements to a waiting period during which no filtering or backflushing takes place, so that there is then thus no liquid flow through the filtering media of the elements, to enhance subsequent filtration.

25. A process as claimed in any one of Claims 9 to 24 inclusive, which includes agitating the slurry in the slurry bed, to inhibit settling of catalyst particles.

26. A process as claimed in Claim 25, wherein the agitation includes allowing slurry in the slurry bed to pass downwardly from a high level to a lower level, through at least one downcomer.

27. A process as claimed in Claim 26, which includes operating the vessel such that the slurry bed is in a heterogeneous or churn-turbulent flow regime and comprises a dilute phase consisting of fast-rising large bubbles of gaseous reactants, and possibly gaseous products, which traverse the reaction zone or slurry bed virtually in a plug flow manner, and a dense phase comprising liquid product, solid catalyst particles and entrained smaller bubbles of gaseous reactants and gaseous product.